

WHAT IS CLAIMED IS:

1. A nitride-based semiconductor laser device comprising:

5       a substrate consisting of either a nitride-based semiconductor doped with an impurity or a boride-based material;

      an n-type cladding layer formed on said substrate;

      an active layer consisting of a nitride-based semiconductor formed on said n-type cladding layer;

10       a p-type cladding layer formed on said active layer;

      and

      a light guide layer formed only between said active layer and said p-type cladding layer in the interspaces

15       between said active layer and said n-type and p-type cladding layers.

2. The nitride-based semiconductor laser device according to claim 1, wherein

20       said substrate absorbs part of light generated in said active layer.

3. The nitride-based semiconductor laser device according to claim 2, wherein

25       said impurity doped into said substrate is oxygen.

4. The nitride-based semiconductor laser device according to claim 1, wherein  
said n-type cladding layer is undoped.

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5. The nitride-based semiconductor laser device according to claim 1, wherein  
said n-type cladding layer is doped with Ge.

10 6. The nitride-based semiconductor laser device according to claim 1, further comprising a layer, formed between said substrate and said n-type cladding layer, consisting of an undoped nitride-based semiconductor.

15 7. The nitride-based semiconductor laser device according to claim 1, further comprising a layer, formed between said substrate and said n-type cladding layer, consisting of a nitride-based semiconductor doped with Ge.

20 8. The nitride-based semiconductor laser device according to claim 1, wherein  
said substrate includes either a GaN substrate or a ZrB<sub>2</sub> substrate.

25 9. The nitride-based semiconductor laser device

according to claim 1, wherein

    said p-type cladding layer includes a p-type cladding layer consisting of a nitride-based semiconductor having a lattice constant smaller than the lattice constant of GaN,

5 and

    said light guide layer is constituted of a nitride-based semiconductor having a lattice constant larger than the lattice constant of GaN.

10       10. The nitride-based semiconductor laser device

according to claim 9, wherein

    said light guide layer consists of InGaN.

11. The nitride-based semiconductor laser device

15 according to claim 1, wherein

    said light guide layer is undoped.

12. The nitride-based semiconductor laser device

according to claim 1, further comprising an n-type carrier  
20 blocking layer, formed between said n-type cladding layer and said active layer, consisting of a nitride-based semiconductor having a refractive index smaller than the refractive index of said n-type cladding layer.

25       13. The nitride-based semiconductor laser device

according to claim 12, wherein

    said n-type cladding layer includes an n-type  
    cladding layer consisting of AlGaN having a first Al  
    composition ratio, and

5       said n-type carrier blocking layer includes an n-type  
    carrier blocking layer consisting of AlGaN having a second  
    Al composition ratio larger than said first Al composition  
    ratio.

10       14. The nitride-based semiconductor laser device  
    according to claim 1, further comprising an n-type carrier  
    blocking layer, formed between said n-type cladding layer  
    and said active layer, consisting of a nitride-based  
    semiconductor having a band gap larger than the band gap  
15       of said n-type cladding layer and the band gap of said  
    active layer.

15. The nitride-based semiconductor laser device  
according to claim 14, wherein

20       said n-type cladding layer includes an n-type  
    cladding layer consisting of AlGaN having a first Al  
    composition ratio while said active layer includes an  
    active layer consisting of InGaN, and

25       said n-type carrier blocking layer includes an n-type  
    carrier blocking layer consisting of AlGaN having a second

Al composition ratio larger than said first Al composition ratio.

16. The nitride-based semiconductor laser device  
5 according to claim 1, further comprising an impurity introduction layer formed by introducing an impurity into a region other than said p-type cladding layer and a current path part of a nitride-based semiconductor layer formed on said p-type cladding layer.

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17. The nitride-based semiconductor laser device according to claim 16, wherein  
said impurity introduction layer is an ion implantation layer.

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18. The nitride-based semiconductor laser device according to claim 16, wherein  
said impurity includes carbon, and  
the maximum value of the impurity concentration of  
20 carbon in said impurity introduction layer is at least about  $5 \times 10^{19} \text{ cm}^{-3}$ .

19. The nitride-based semiconductor laser device according to claim 1, further comprising an undoped p-side  
25 contact layer formed on said p-type cladding layer.

20. The nitride-based semiconductor laser device according to claim 19, wherein

5        said active layer includes an active layer of a quantum well structure consisting of a nitride-based semiconductor containing In, and

10        said undoped p-side contact layer has a thickness smaller than the thickness of a quantum well layer of said active layer and an In composition ratio smaller than the In composition ratio of said quantum well layer.

21. The nitride-based semiconductor laser device according to claim 20, wherein

15        the thickness of said undoped p-side contact layer is at least about 3 nm and not more than 5 nm.

22. The nitride-based semiconductor laser device according to claim 20, wherein

20        the In composition ratio of said undoped p-side contact layer is at least about 0.05 and smaller by at least about 0.05 than the In composition ratio of said quantum well layer of said active layer.